Rapa Nui Rocks Update

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Easter Island is not the only place where ancient people moved huge rocks into places too constricted to accommodate the long columns of laborers needed to drag them there. The construction ramp leading up to the Inca "Fortress" of Ollantaytambo in Peru is another classic example. Blocks there weighing more than 50 tons were first transported to the very steep (1:4, or 25%), narrow (six meters wide) ramp onto its dead-end at a shear 16 meter drop-off. Once there, they were rotated 90 degrees around a sharp left turn, moved across a tiny (15 meter square) hilltop plaza and levered up to a vertical position. It was the Andean equivalent of rotating and raising a 50 ton *moai* onto a high seacoast *ahu* and could not have been done by large gangs of people pulling on ropes, since there was no place for them to work.

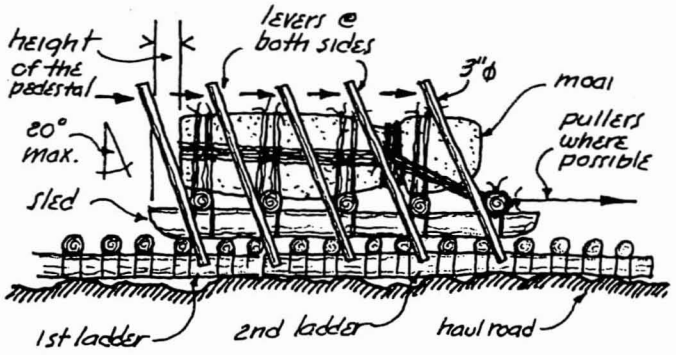

Figure 2. Sketch showing overland movement of sled with statue loaded prone.

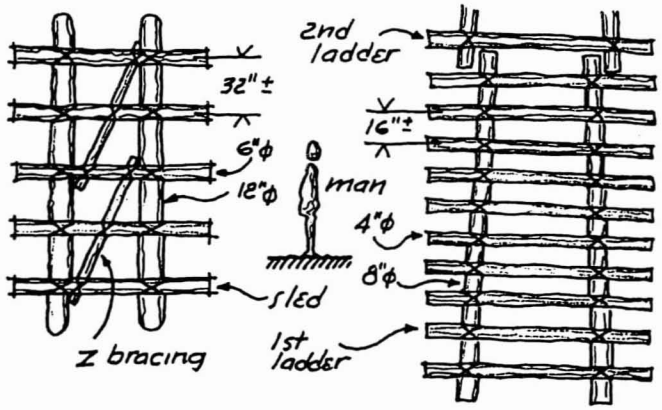

Figure 1. Plans of proposed sled and slider ladders.

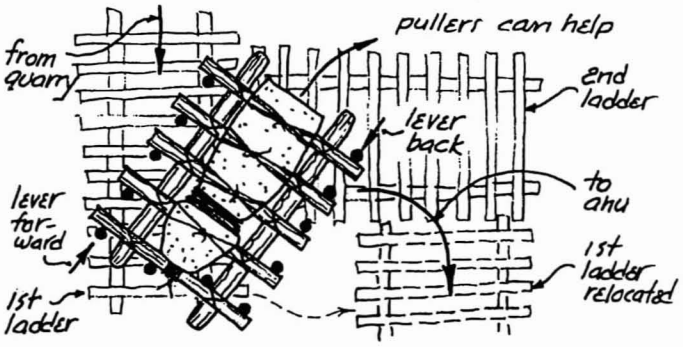

Figure 3. Sketch showing scheme for rotating sled 180 degrees en route.

To determine if this problem could be solved by the levering scheme I proposed on Easter Island, I decided to try again, correcting the mistakes we made during the NOVA shoot (Figures 1-3) and using an even bigger rock. My friend and fellow megalith buff, Bruce Davis, built a scaled-down replica of the Ollantaytambo ramp at his equipment yard in Brighton, Colorado (Figure 4). On December 15th, my wife Nancy, son Christopher, and about 25 volunteers set out to lever a 13 ton block of white marble across the yard and up the slope. At the top, they were to rotate it 90 degrees. There would be no help from pullers and no one was to work off the ramp.

Assuming the Incas might have used camelid fat as a lubricant, we

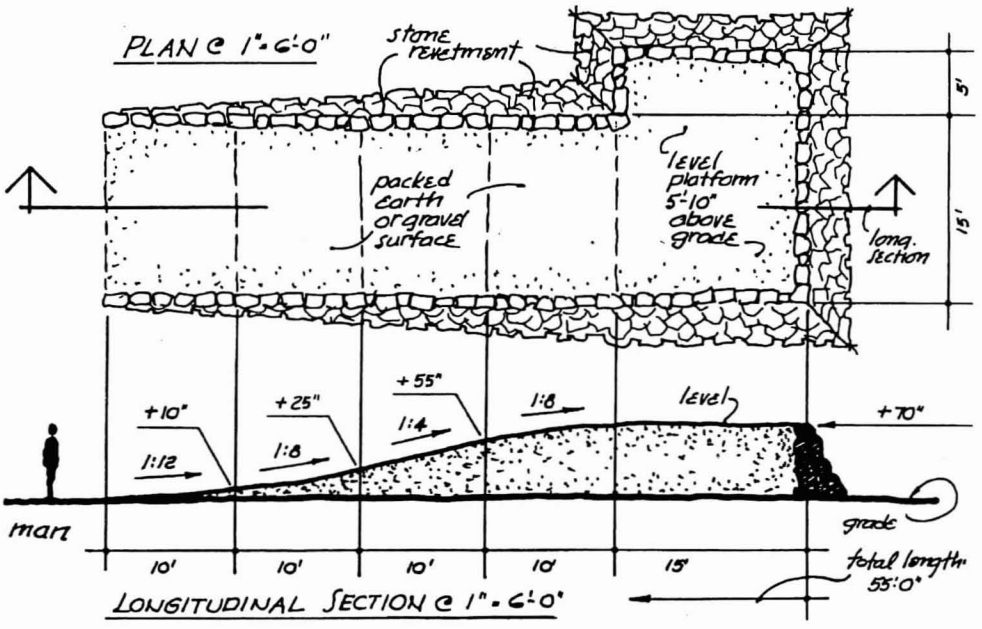

Figure 4. Sketch of the scaled-down replica of the Ollantaytambo ramp.

Figure 5. Sled runners and ladders being greased with lard.

Figure 6. Crew moving the sled with long levers while standing on top of the block.

Figure 7. Moving the block up the ramp.

greased our sled runners and ladders with lard (Figure 5). On the level, 8 people standing atop the rock were just able to move the sled, each accounting for about 3687 pounds of load. Their own weight, added to that of the block and its sled, was much more than off-set by the increased advantage of their long levers (Figure 6). At the steepest, 25%, part of the ramp, 26 people were needed, with each moving about 1134 pounds uphill (Figure 7). At the top, the rotation was done exactly as expected by about 12 people (Figure 8). No changes to the method, the sled or the ladders were needed. Once we got into the rhythm of resetting levers and leapfrogging ladders the technique proved quite easy and we completed the entire move in about two hours.

Figure 8. Rotating the block 90 degrees at the top of the ramp with levers.

We have no direct evidence that our method was ever used by the Incas, the ancient Rapa Nui, or anyone else. Nevertheless, applying the above numbers to the specific requirements of the Ollantaytambo ramp suggests that about 100 people using similar ladders and a 4x11 meter sled could have levered a 50 ton block up the slope, around the corner and into place at the top. I am aware of no other system, either proven or proposed, able to achieve these results.